Building More Secure Systems for the Critical Infrastructure

The Role of IT Security Standards, Metrics, and Assessment Programs

Dr. Ron Ross

Today's Climate

- Rapidly changing information technologies and compressed technology life cycles
- Growing complexity of IT products and systems
- Increasing connectivity among systems
- Dependence on commercial off-the-shelf IT products and systems
- Need for greater assurance in critical information infrastructures (both public and private sector)

Today’s Challenge

- Consumers have access to an increasing number of security-enhanced IT products with different capabilities and limitations
- Consumers must decide which products provide an appropriate degree of protection for their information systems
- *Impact: Choice of products affects the security of systems in the critical information infrastructure*

The Fundamentals

Building more secure systems depends on the use of---

- Well defined IT security requirements and security specifications

  - describing what types of security features we want…

- Quality security metrics and appropriate testing, evaluation, and assessment procedures

  - providing assurance we received what we asked for…

What Is Needed?

- Producers of IT products need to have a better understanding of consumer's information security requirements
- Consumers of IT products, systems, and networks need to have better ways to:
  - ✓specify desired security features and assurances
  - ✓assess the security claims made by producers

The International Standard

Common Criteria-ISO/IEC 15408

What the standard is –

- Common structure and language for expressing product/system IT security requirements
- Catalog of standardized IT security requirement components and packages

How the standard is used –

- Develop IT security requirements and specifications for products and systems
- Evaluate products and systems against known and understood IT security requirements

Defining Requirements

ISO/IEC Standard 15408

Common Criteria

A flexible, robust catalogue of standardized IT security requirements (features and assurances)

Protection Profiles

Access Control
Identification
Authentication
Audit
Cryptography

- ✓ Operating Systems
- ✓ Database Systems
- ✓ Firewalls
- ✓ Smart Cards
- ✓ Applications
- ✓ Biometrics
- ✓ Routers
- ✓ VPNs

Consumer-driven security requirements in specific information technology areas

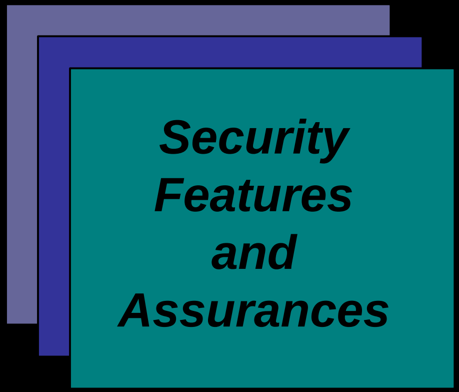
Industry Responds

Protection Profile

Firewall Security Requirements

Consumer statement of IT security requirements to industry in a specific information technology area

Security Targets



Security Features and Assurances

- ✓ CISCO Firewall
- ✓ Lucent Firewall
- ✓ Checkpoint Firewall
- ✓ Network Assoc. Firewall

Vendor statements of security claims for their IT products

Demonstrating Conformance

Security Features and Assurances

Vendors bring IT products to independent, impartial testing facilities for security evaluation

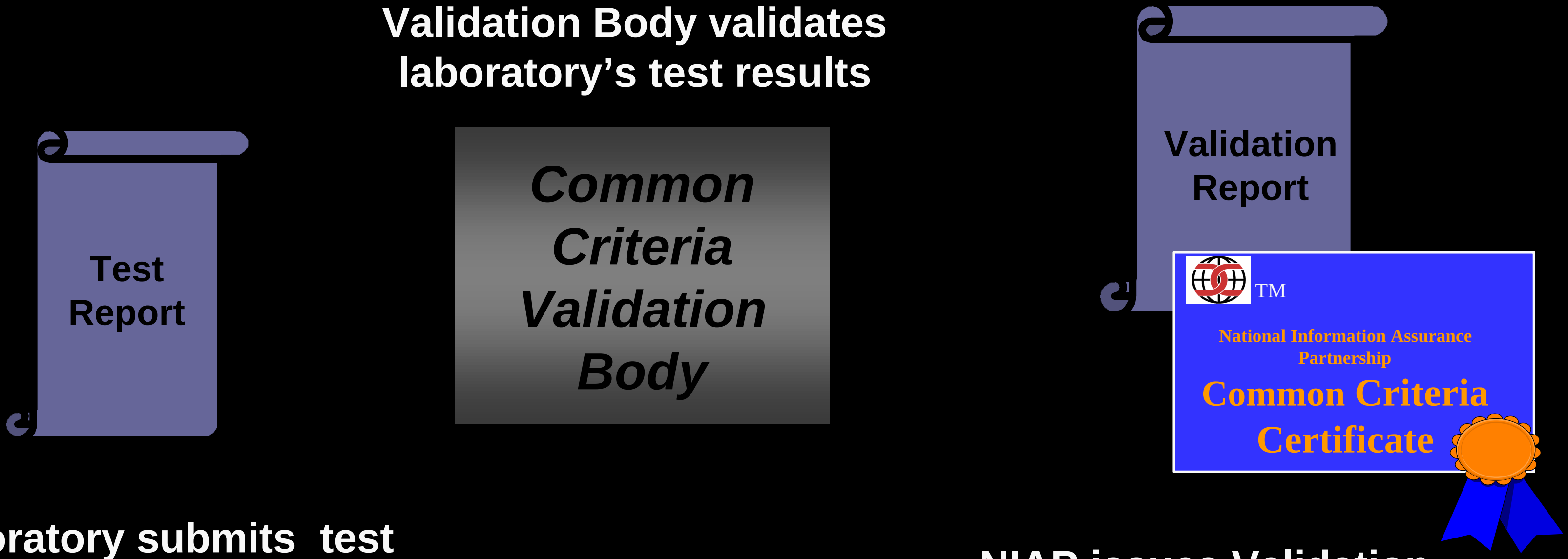
Private sector, accredited security testing laboratories conduct evaluations

Common Criteria Testing Labs

Test Reports

Test results submitted to NIAP for post-evaluation validation

Validating Test Results



Validation Body validates laboratory's test results

Test Report

Common Criteria Validation Body

Validation Report

TM

National Information Assurance Partnership

Common Criteria Certificate

Laboratory submits test report to Validation Body

NIAP issues Validation Report and Common Criteria Certificate

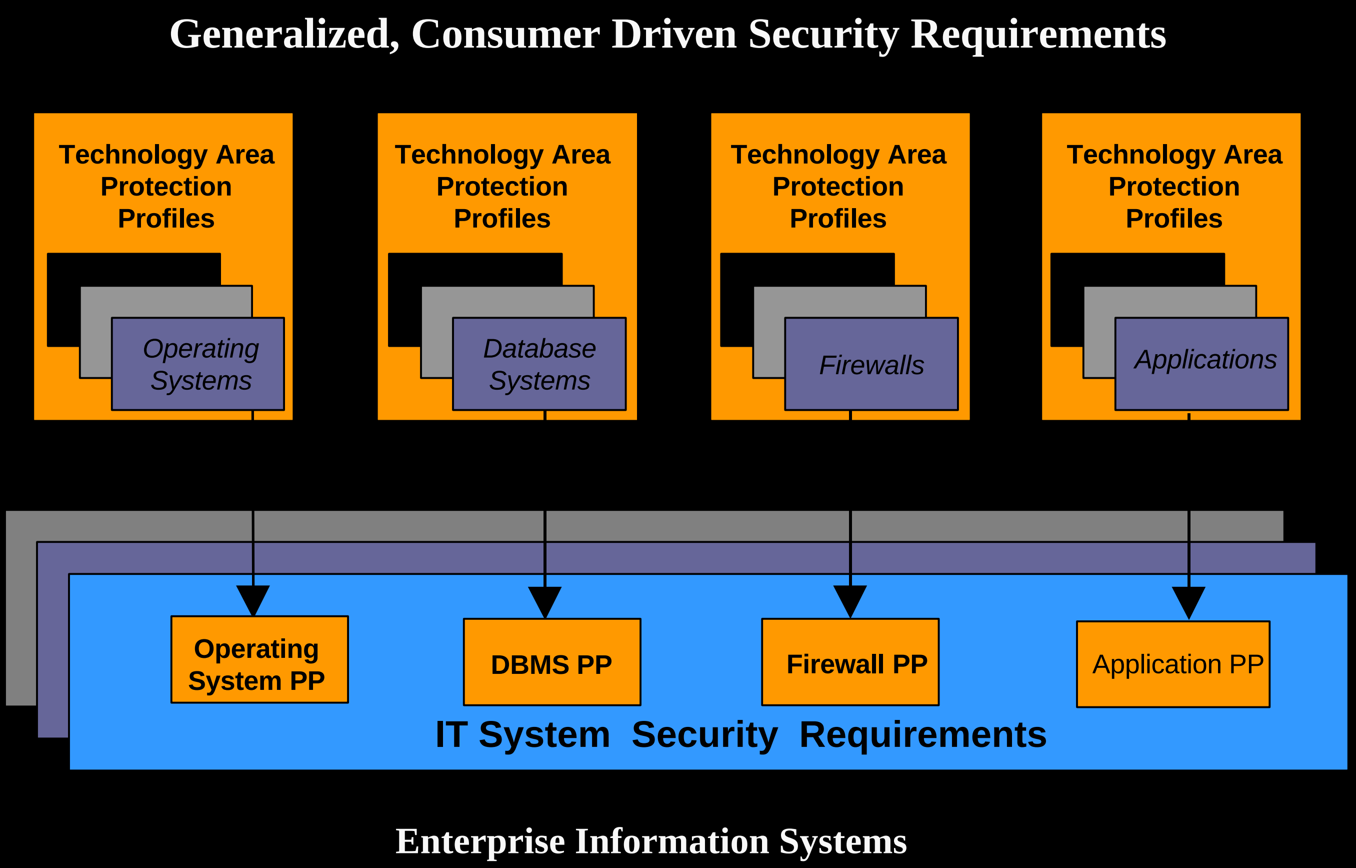
Mutual Recognition Arrangement

NIAP, in conjunction with the U.S. State Department, negotiated a Common Criteria Recognition Arrangement that:

- Provides recognition of U.S. issued Common Criteria certificates by 13 nations:

  Australia, Canada, Finland, France, Germany, Greece, Israel, Italy, New Zealand, Norway, Spain, The Netherlands, United Kingdom
- Eliminates need for costly security evaluations in more than one country
- Offers excellent global market opportunities for U.S. IT industry

Role of Protection Profiles

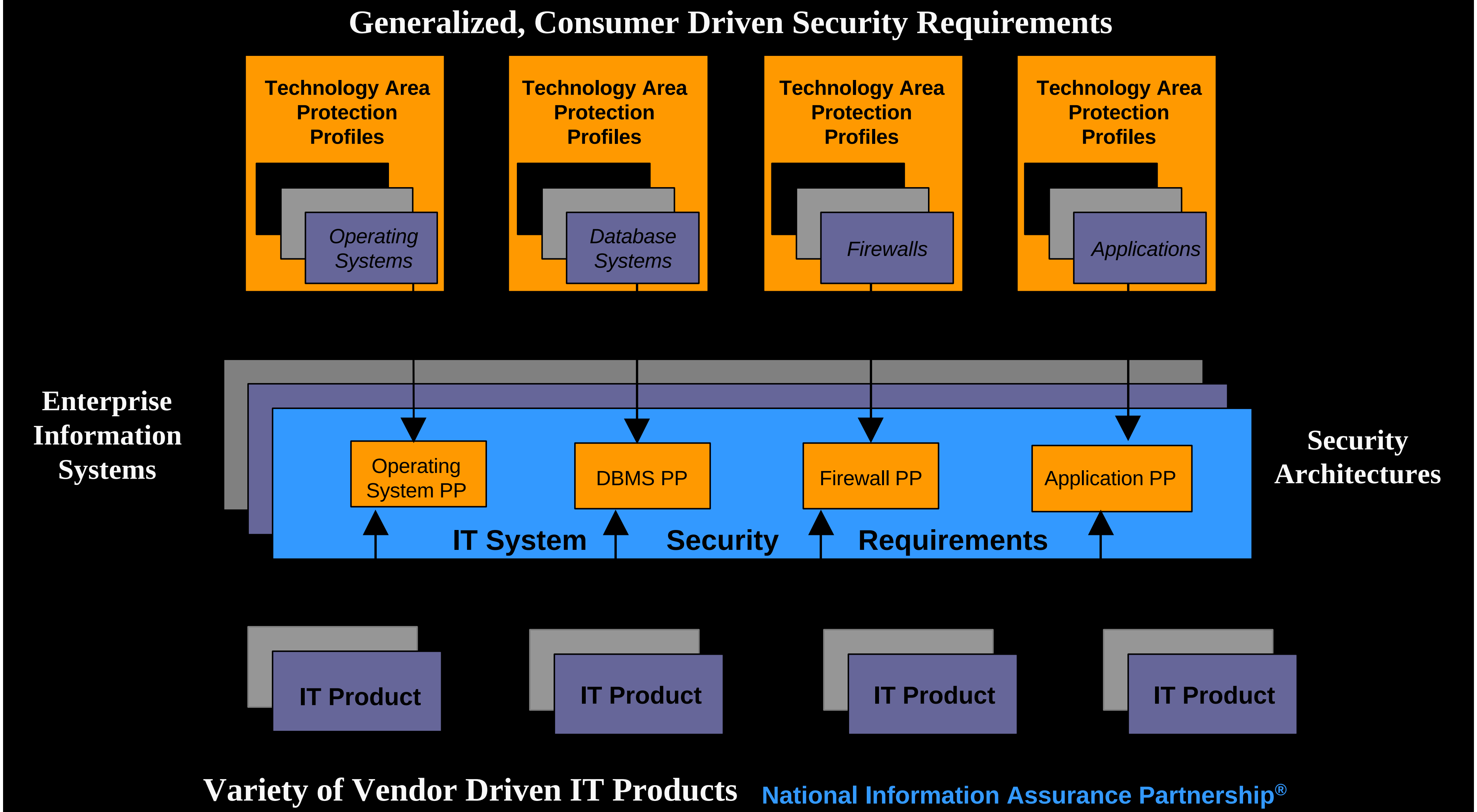


Generalized, Consumer Driven Security Requirements

Technology Area Protection Profiles
Operating Systems
Technology Area Protection Profiles
Database Systems
Technology Area Protection Profiles
Firewalls
Technology Area Protection Profiles
Applications
Operating System PP
DBMS PP
Firewall PP
Application PP
IT System Security Requirements

Enterprise Information Systems

Role of Protection Profiles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Applications
Enterprise Information Systems
Operating System PP
DBMS PP
Firewall PP
Application PP
IT System Security Requirements
Security Architectures
IT Product
IT Product
IT Product
IT Product
Variety of Vendor Driven IT Products

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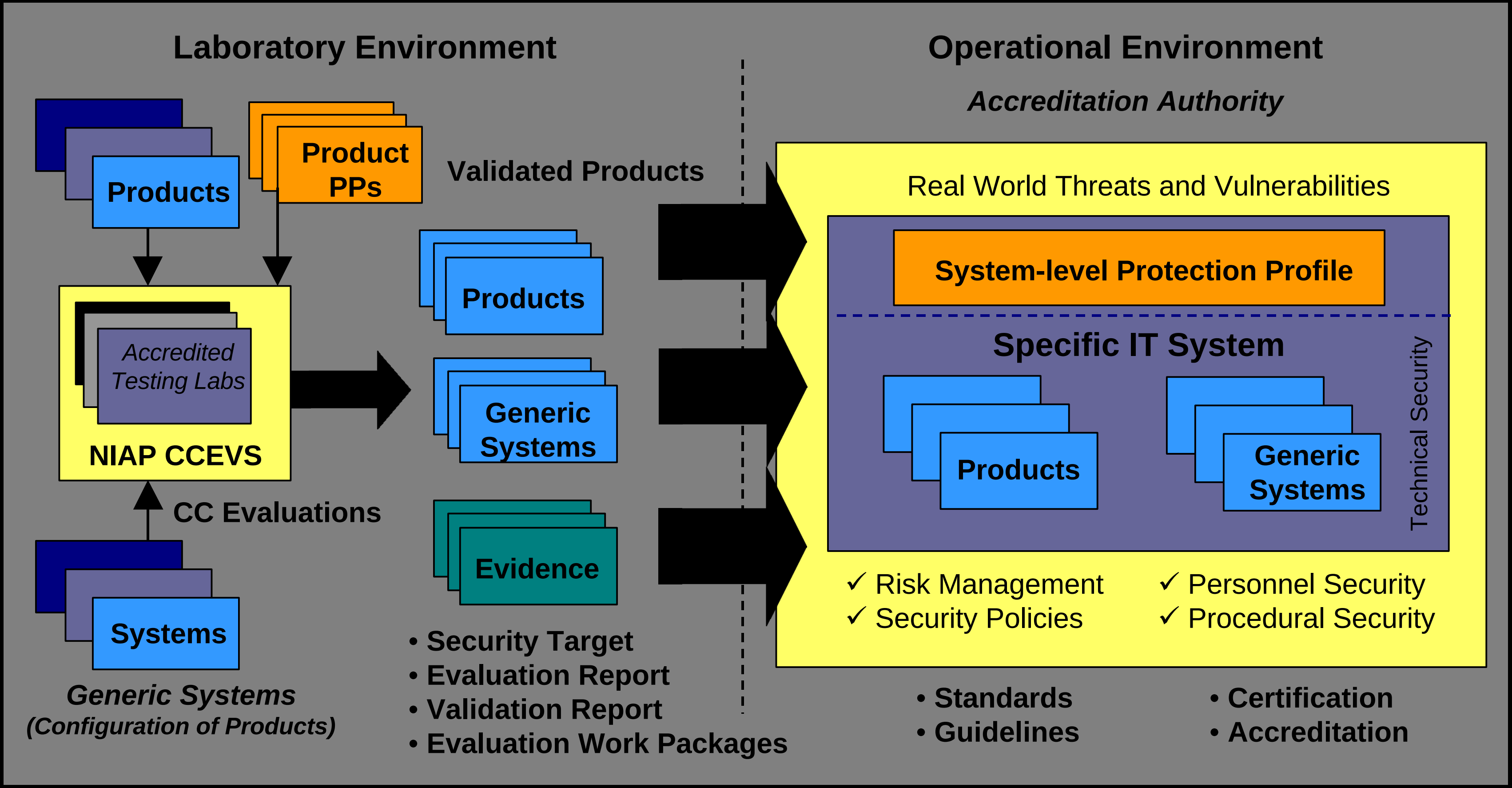
A Comprehensive Approach

Linking Critical Assessment Activities



✓ Risk Management
✓ Security Policies
✓ Personnel Security
✓ Procedural Security

Generic Systems
(Configuration of Products)

- Security Target
- Evaluation Report
- Validation Report
- Evaluation Work Packages

- Standards
- Guidelines

- Certification
- Accreditation

Industry Engagement Strategy

NIAP will engage the IT industry in several important ways--

- Facilitate IT security requirements definition (by technology area and sector)
- Promote private sector IT security evaluations and assessments
- Conduct security testing research and development

NIAP Testing Advantages

- Specification of security features and assurances based on an international standard
- Evaluation methodology based on an international standard---leading to comparability of test results
- Security testing laboratory expertise assessed by recognized national bodies; quality technical oversight provided by government experts
- Testing results recognized by many nations
- Reduced testing costs to sponsors of evaluations
- Compliance with NSTISSP 11

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